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Fleet Analysis for EV Suitability

June
2021

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Agenda

1. Why EVs
2. What is EV Suitability
3. Future Planning
4. FleetDASH
5. AFV Screening Tool
6. Benefits of Identifying EV Candidates with Telematics

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Challenges to Overcome

Upfront Costs

Model Availability

Eligibility/Sustainable Fleet

Infrastructure

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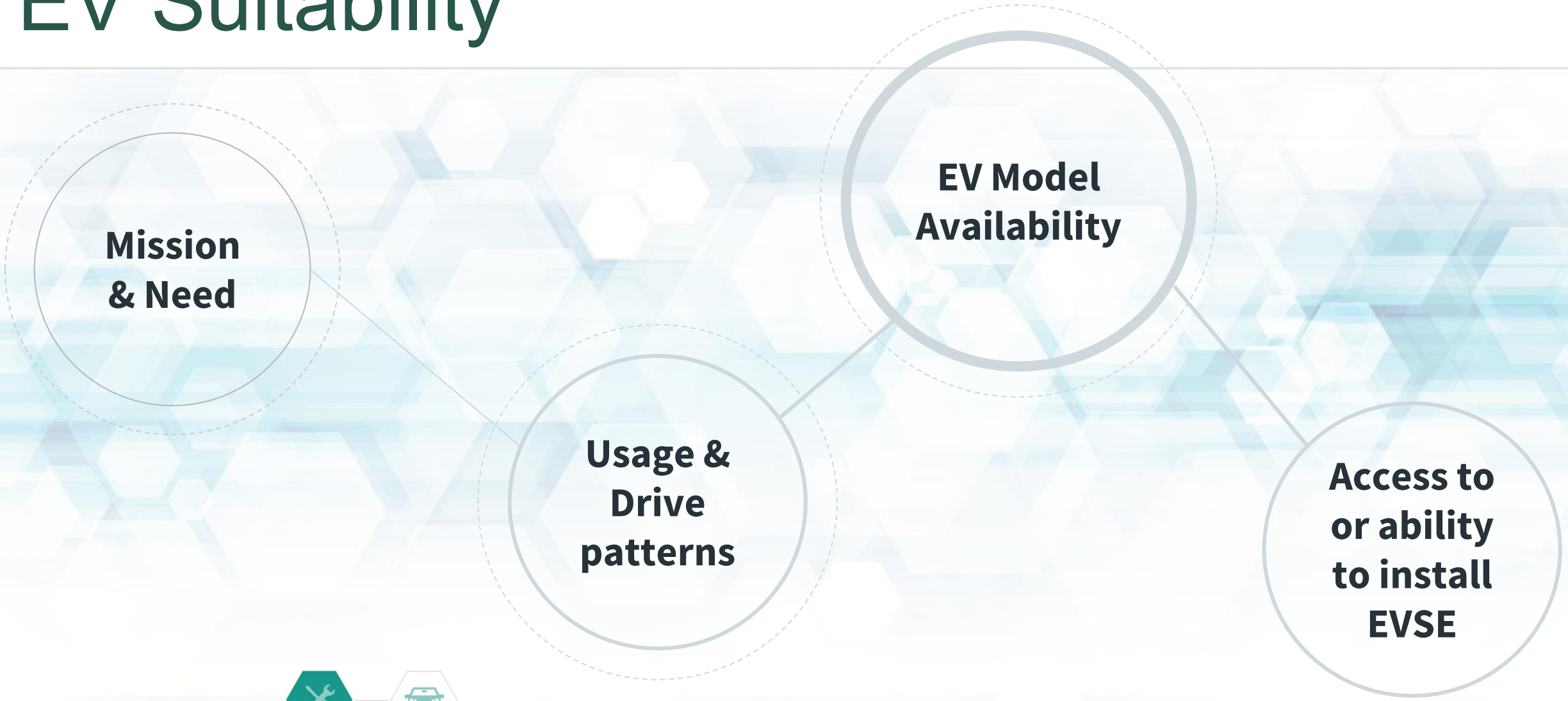
EV Suitability



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EV Suitability Process

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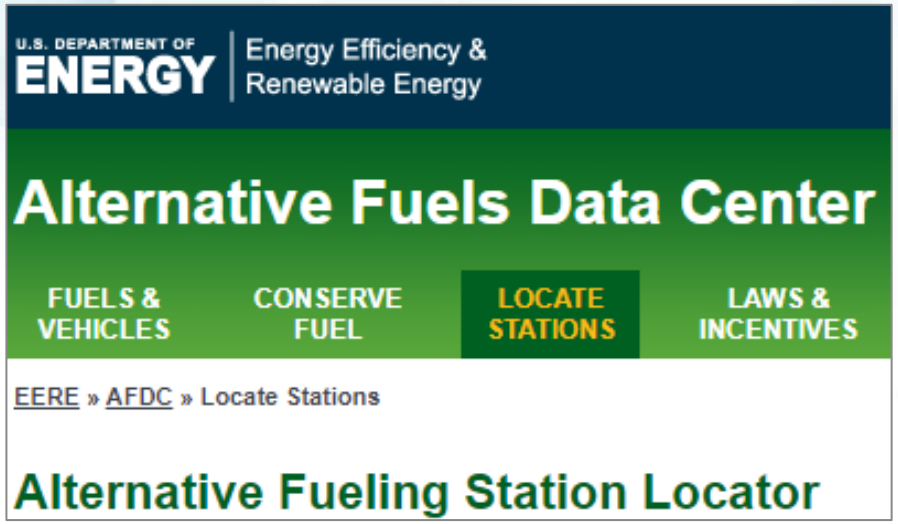
Identify

Match Eligible Inventory with current EV Model Availability

Compare Locations to existing AO-EVSE inventory & identify gap(s)

Target Locations with clusters of EV-able eligible vehicles



DOE Alternative Fueling Station Locator

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Assign EV Replacements to Existing Vehicles

Available Today

Like-for-Like SIN based on current BEV and PHEV models available from GSA.

SINs include 8E, 8P, 9E, 10E, 20P, 96P, 96E, 91E, 98E, 98P, 105E, 241, 242, 341, 342, Proterra Transit

Stretch SINs

Stretch into similar SINs based on current BEVs and PHEVs available from GSA Fleet:

10B/12A → 8E, 8P, 9E, 10E, 98P

21 → 20P

99 → 96P or 96E

Projected Availability

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Like for EV-Like Replacements

Subcompact Sedan (SINs 8C/8H)

Chevy Bolt 8E, Hyundai Ioniq 8P

Compact/Midsize Sedan (SINs 9C/9H/10B)

Tesla Model 3 9E, Tesla Model S 10E, Ford Escape PHEV 98P, Kona 98E

4X2 Compact SUV (SINs 98A/98)

Kia Niro PHEV 98P, Ford Escape PHEV 98P, Hyundai Kona 98E

AWD Crossover SUV (SIN 96, some SIN 99A/99 needs)

Ford Mustang Mach-E and Tesla Model Y (96E), Mitsubishi Outlander 96P

4X2 Crossover SUV (SINs 91)

Ford Mustang Mach-E, 91E

Minivan/ Larger Pass. Vans (SINs 20/20B/21)

Chrysler Pacifica, 20P

12-16 Passenger Shuttle Bus (SINs 241/2 and 341/2)

TESCO, Turtle Top Motiv 241/2 & 341/2

4X4 Intermediate SUV (SIN 105A)

Tesla Model X & more to come!

Visit gsa.gov/afv to view the latest ZEV Fact Sheet and dimension comparisons!

Dimension Comparisons

AWD Compact SUVs

SIN 96 GMC Terrain (GA

SIN 96P Mitsubishi Outlander (PHEV)

SIN 96E Mustang Mach-E (BEV)

Subcompact Sedan

SIN 8C Hyundai Elantra (GAS

SIN 8E Chevy Bolt V)

SIN 8P Hyundai Ioniq (PHEV)

Find dimension comparisons at gsa.gov/afv

EV Suitability Process: Evaluate

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EV Suitability Process: Plan

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Deploying Infrastructure

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gsa.gov/evse

Electric Vehicle Supply Equipment (EVSE)
Blanket Purchase Agreement (BPA)

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WBDG Whole Building Design Guide

www.wbdg.org/ffc/dod/unified-facilities-guide-specifications-ufgs/ufgs-11-11-37

Infrastructure Considerations

Level / charging speed?

- PHEVs have small batteries; May not require Level 2 ports
- For BEVs level 2 is sufficient
- Off grid options (portable/solar?)

Ratio of Ports to Vehicles?

- Often, less than 1:1 port for BEVs (consider usage, availability of public stations)
- Vehicles do not need to charge every night

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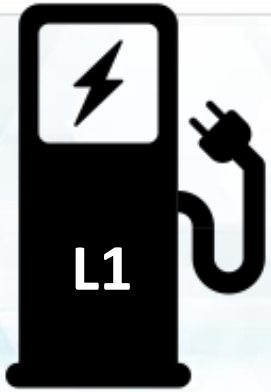
In an 8 Hour Work Day...

*Does not include price of installation
NOTE: Each station can charge up to 2 vehicles

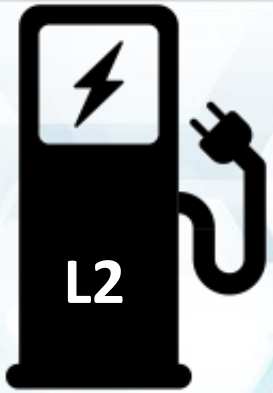


$0 - $1,500*

Outlander PHEV

OR

Kia Niro PHEV



$600-$10,000*

Chevy Bolt

OR

OR

Pacifica PHEV

Outlander PHEV

$12,000-$50,000*

Chevy Bolt

Future of Telematics / Enhanced Data

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What can you do today?

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Join us for some FY21 Early Wins!

Eligible

EV Replacement that Meets Mission

Near Existing EVSE or Public WEX-accepting stations

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Overcome Electrification Cultural Change

Preparation Matters: 71% of agencies that felt extremely prepared for their EV, report being extremely satisfied with their EV. Of those that felt unprepared to receive their EV, only 8% report being extremely satisfied. *(2018 GSA Survey to EV Drivers)*

Set and communicate goals	Install proper infrastructure based on usage
Create awareness on benefits	Incorporate local input during vehicle ordering
Reward fleets for using new technology	Set challenging, achievable and engaging targets
Develop or find accurate and engaging training (DOE/GSA)	Start small, share success stories, and then grow

Implement!

- Retrofit vehicles with telematics
- Update Garage locations
- Begin planning with assessing mission against available ZEVs
- Connect with GSA for data & support

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FleetDASH

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FleetDASH Background

Alternative fuel vehicles (AFVs) and alternative fuel use mandates

Legislative Mandates

EPAct 1992:
75% LD vehicles AFVS
EPAct 2005, section 701:
Dual-fuel vehicles must use alt fuel
EISA 2007, section 142:
Increase alt fuel and decrease petroleum
EISA 2007, section 246:
Install a renewable fuel pump

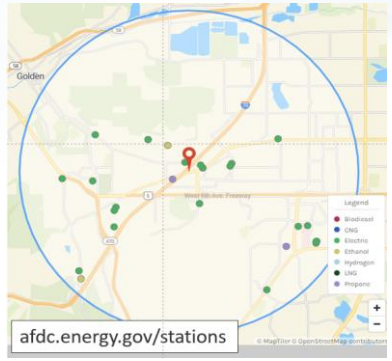
Executive Orders

E. O. 14008 Section 205 (ii):
"clean and zero-emission vehicles for Federal, State, local, and Tribal government fleets, including vehicles of the United States Postal Service."

Credit card transaction data*

**primarily GSA Drive-thru data*

Alternative fuel station locations



DOE Federal Energy Management Program

Fleet Operations Decision Support

- How to efficiently meet regulatory goals?
- Identify missed opportunities to use alternative fuel
- Section 701 regulatory tool

federalfleets.energy.gov/FleetDASH/

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FleetDASH AFV Screening Tool Scope

How can FleetDASH data support successful AFV acquisitions?

Accounting for:

- Fleet vehicle type composition
- Vehicle availability
- Fuel availability
- Fueling behavior
- Vehicle and operating costs
- Maximizing benefits of specific AFVs
- Diverse mission requirements

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FleetDASH AFV Screening Tool Framework

Initially for GSA leased vehicles:

- Majority of fleets in FleetDASH
- GSA AFV Guide defines vehicle availability and cost structure

Replacement assumptions:

- Light-duty: Replace like standard item number (SIN)
- Medium and heavy-duty: Replace like vehicle type
- Choose lowest incremental cost AFV

Vehicle Availability

GSA Vehicle Availability Listing
GSA Alternative Fuel Vehicle Guide (fiscal year 2021):

- Vehicle types
- Fuel technologies available
- Fuel economy ratings
- Lease costs

GSA AFV Guide:
https://www.gsa.gov/buying-selling/products-services/transportation-logistics-services/fleet-management/vehicle-leasing/alternative-fuel-vehicles

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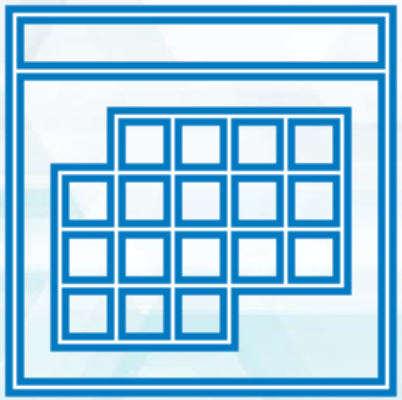
Note: Ford Mach-E & Tesla models are not yet in the FleetDASH tool.

Vehicle Cost Estimates

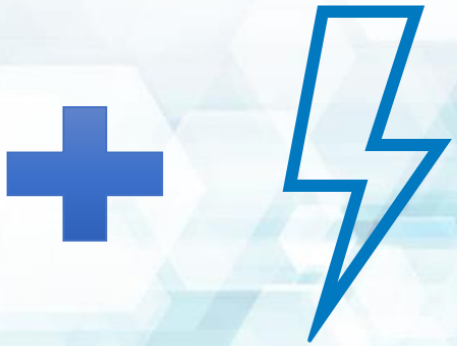
The FleetDASH AFV Screening tool primarily considers ***annual operating costs.***



Monthly rate X
12 months

Mileage rate X
estimated annual miles

GSA AFV Guide



Estimated EV kWhs used X
10.54 cents

www.eia.gov/electricity/annual/html/epa_02_04.html

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FleetDASH Screening Tool Tour

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Agency View

FleetDASH Website:
https://federalfleets.energy.gov/FleetDASH

Section 701 | Fuel Use | Inventory | Greenhouse Gas | AFV Screening

The AFV Screening Tool identifies (1) which vehicles could be replaced by available alternative fuel technologies within the same vehicle segment and (2) how often the fleet operates near available alternative fuel. The tool includes only GSA Leased vehicles.

Organization Summary

The Organization and Fleet summary tables display:

- The number of vehicles that could be replaced by each alternative fuel vehicle technology within the existing vehicle segment.
- The percent of total fuel use across all fuel types in the prior fiscal year that was purchased within 3 miles of existing alternative fuel stations.

Clicking an individual fleet will display summary data specific to the selected entity.

[redacted]	Vehicles	Available Replacements[1] Based on Vehicle Segment							Percent of GGEs[2] Near Alternative Fuel			
		BEV	PHEV	HEV	E85	B20	CNG	LPG	E85	B20	CNG	LPG
Light-Duty	886	183	382	401	594	4	0	0	66%	0%	36%	8%
Medium and Heavy-Duty	310	0	0	0	265	310	12	12	71%	1%	40%	16%
Total	1,196	183	382	401	859	314	12	12	68%	0%	38%	11%

1. Vehicle availability determined by **fiscal year 2021** GSA alternative fuel vehicle guide.
2. Calculations based on **fiscal year 2020** totals.

Fleet Organization View

Electric vehicle opportunities?

E85 opportunities?

Fleet	Vehicles	Available Replacements[1] Based on Vehicle Segment							Percent of GGEs[2] Near Alternative Fuel			
		BEV	PHEV	HEV	E85	B20	CNG	LPG	E85	B20	CNG	LPG
Fleet 1	268	39	55	71	216	68	0	0	97%	0%	97%	0%
[redacted]	205	7	54	46	182	50	0	0	72%	1%	56%	0%
[redacted]	165	43	91	79	87	32	5	5	25%	0%	6%	0%
[redacted]	118	27	39	38	82	37	1	1	5%	1%	3%	87%
[redacted]	101	1	11	28	85	45	0	0	100%	0%	0%	0%
[redacted]	77	4	17	23	66	25	0	0	74%	0%	3%	0%
[redacted]	74	4	25	16	47	31	4	4	94%	0%	1%	0%
[redacted]	56	17	29	17	36	8	0	0	69%	3%	2%	0%
[redacted]	48	25	28	42	11	0	0	0	34%	0%	14%	1%
[redacted]	43	4	11	17	35	11	2	2	36%	0%	39%	1%

1. Vehicle availability determined by **fiscal year 2021** GSA alternative fuel vehicle guide.
2. Calculations based on **fiscal year 2020** totals.

Showing 1 to 10 of 12 entries

Previous 1 2 Next

Light-duty Vehicle Listing

Primary Metrics:
1. Prior year GGEs
2. GGEs reduced
3. Annual operating cost savings

The light-duty vehicle table displays the total fuel used in the prior fiscal year and estimates petroleum savings based on available AFVs in the existing vehicle segment and the availability of alternative fuel stations near the existing vehicle's transactions from the prior fiscal year. AFV options that result in annual operating cost savings are shaded.

Download CSV

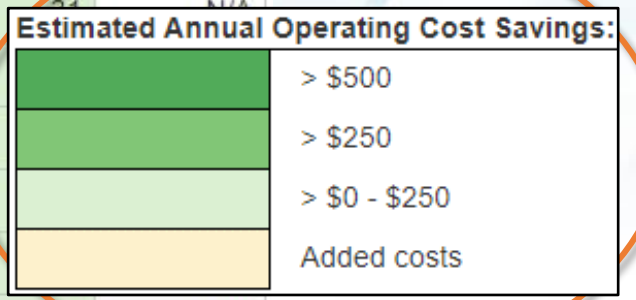
Search:

1

2

Fiscal Year 2020 Light-Duty Vehicle Data				Estimated Petroleum GGEs Reduced*			
VIN	Tag	Vehicle Segment	Total GGEs	BEV	PHEV	HEV	E85
[redacted]	[redacted]	Sedan/St Wgn Subcompact	159	159	118	72	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	151	151	115	56	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	145	145	110	54	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	135	135	95	[illegible]	[illegible]
[redacted]	[redacted]	Sedan/St Wgn Compact	128	128	90	[illegible]	[illegible]
[redacted]	[redacted]	Sedan/St Wgn Compact	126	126	89	[illegible]	[illegible]
[redacted]	[redacted]	Sedan/St Wgn Compact	118	118	89	[illegible]	[illegible]
[redacted]	[redacted]	Sedan/St Wgn Compact	108	108	76	[illegible]	[illegible]
[redacted]	[redacted]	Sedan/St Wgn Compact	107	107	81	40	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	102	102	77	38	N/A

3



* GGEs reduced compared to a base case where prior year GGE consumption is all petroleum use.

Showing 1 to 10 of 200 entries

Previous 1 2 3 4 5 ... 20 Next

Light-duty Vehicle Listing cont.

Interface allows for data sorting, searching for specific vehicles, and downloading summary data.

The light-duty vehicle table displays the total fuel used in the prior fiscal year and estimates petroleum savings based on available AFVs in the existing vehicle segment and the availability of alternative fuel stations near the existing vehicle's transactions from the prior fiscal year. AFV options that result in annual operating cost savings are shaded.

Download CSV

Search:

Fiscal Year 2020 Light-Duty Vehicle Data				Estimated Petroleum GGEs Reduced*			
VIN	Tag	Vehicle Segment	Total GGEs	BEV	PHEV	HEV	E85
[redacted]	[redacted]	Sedan/St Wgn Subcompact	159	159	118	72	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	151	151	115	56	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	145	145	110	54	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	135	135	95	31	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	128	128	90	29	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	126	126	89	29	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	118	118	89	44	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	108	108	76	25	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	107	107	81	40	N/A
[redacted]	[redacted]	Sedan/St Wgn Compact	102	102	77	38	N/A

* GGEs reduced compared to a base case where prior year GGE consumption is all petroleum use.

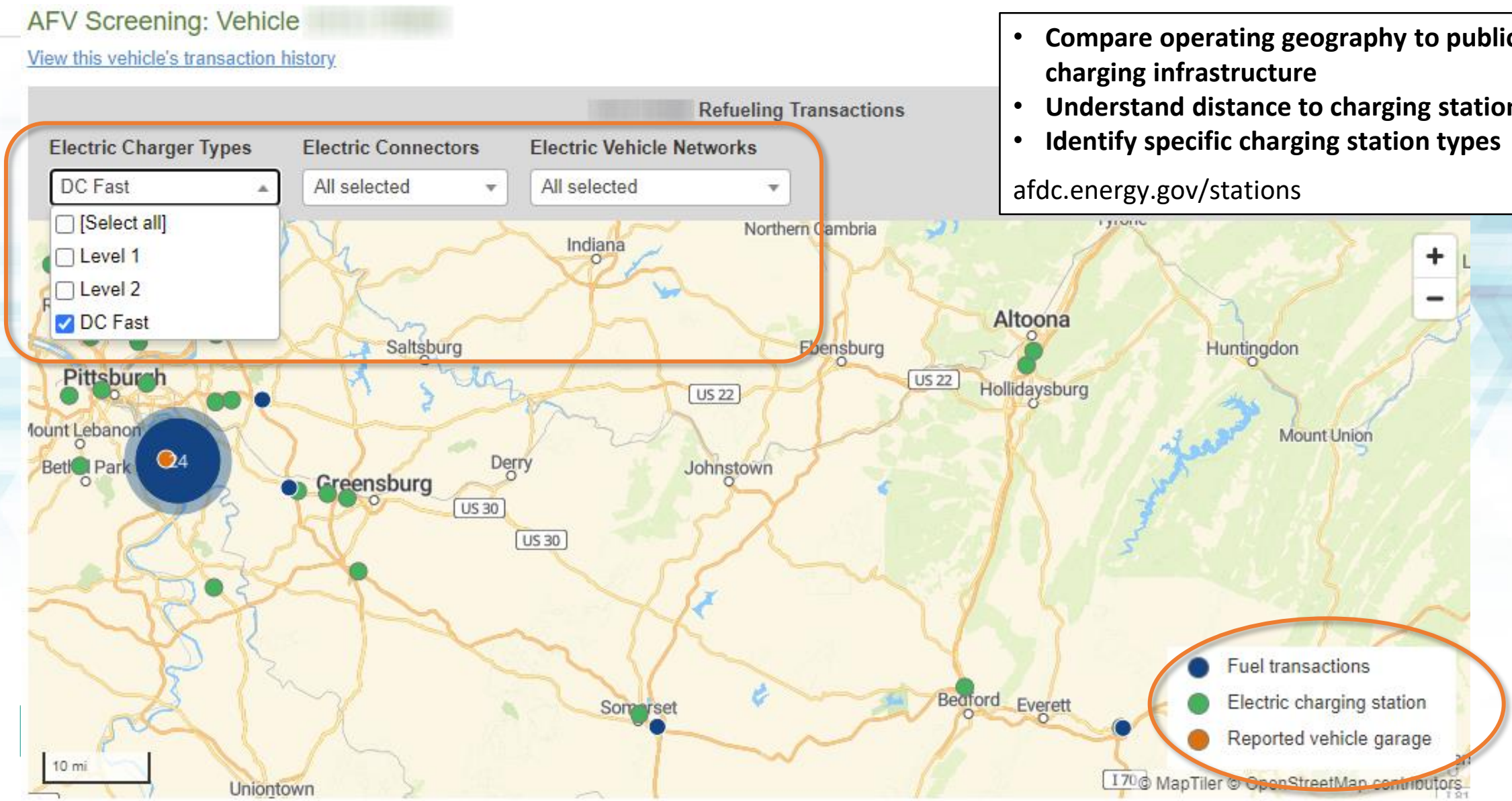
Showing 1 to 10 of 200 entries

Previous 1 2 3 4 5 ... 20 Next

Light-duty Vehicle Details – Map 1

- **Compare operating geography to public charging infrastructure**
- **Understand distance to charging stations**
- **Identify specific charging station types**

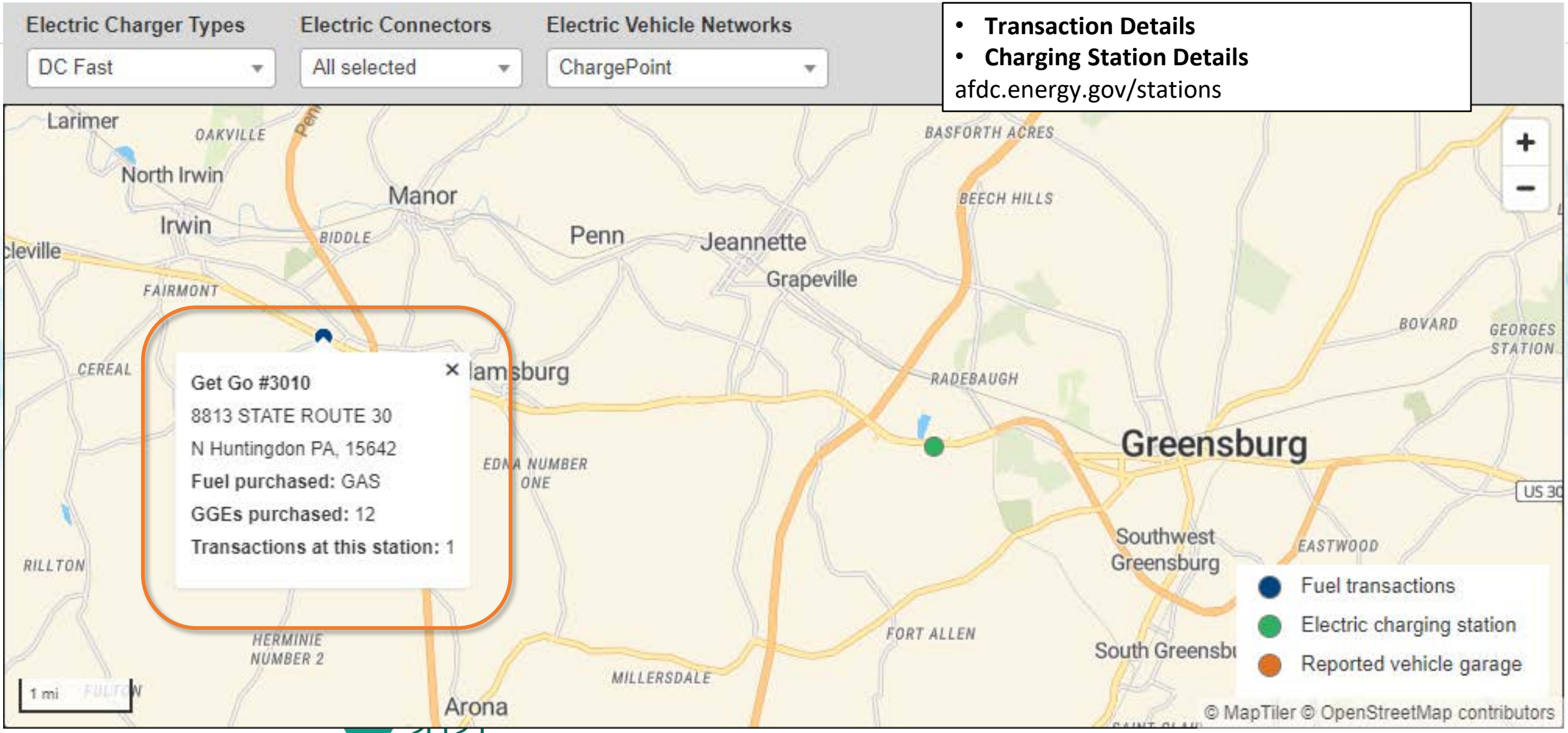
afdc.energy.gov/stations



Light-duty Vehicle Details – Map 2

- **Transaction Details**
- **Charging Station Details**

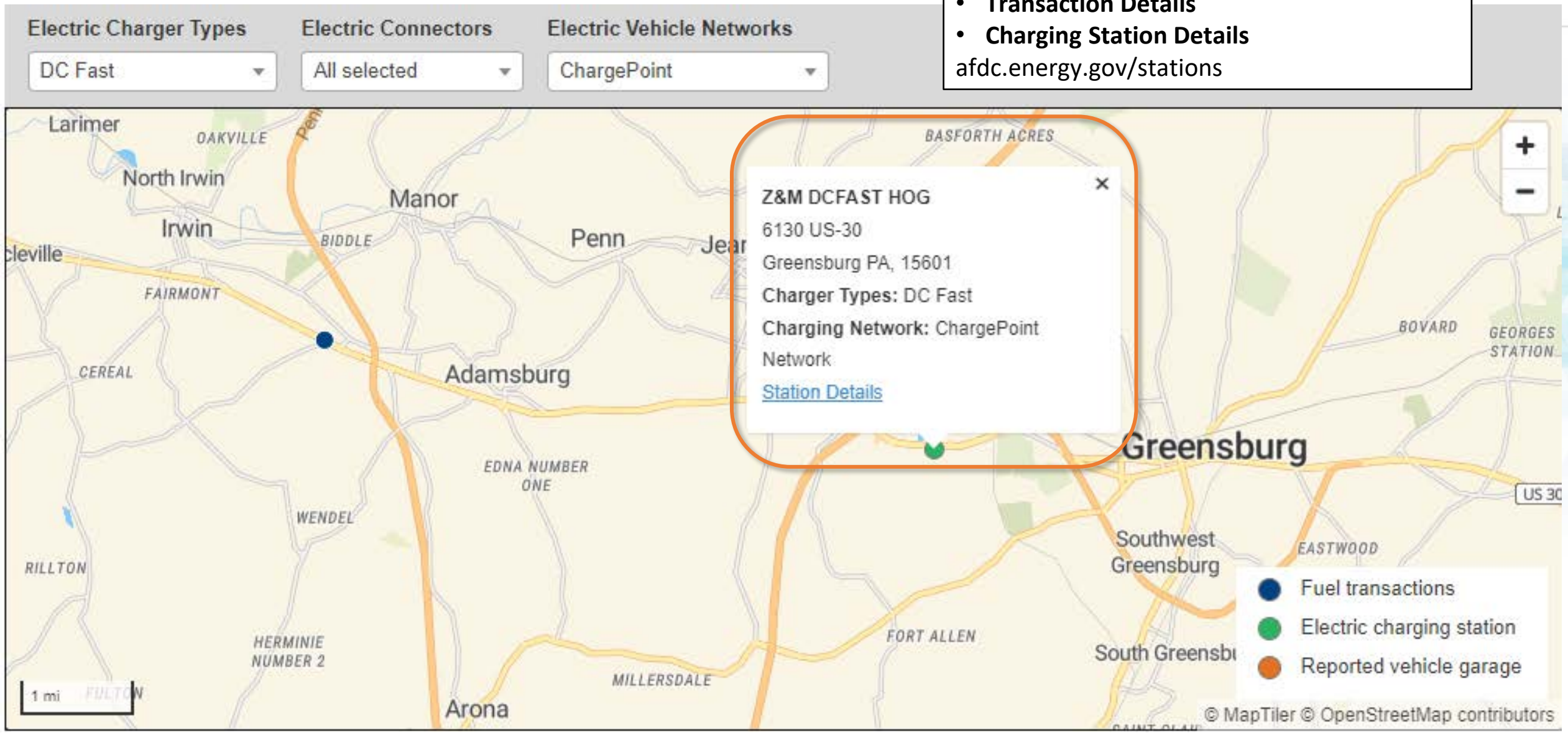
afdc.energy.gov/stations



Light-duty Vehicle Details – Map 3

- **Transaction Details**
- **Charging Station Details**

afdc.energy.gov/stations



Light-duty Vehicle Details

Current Vehicle Fiscal Year 2020 Summary						
VIN	Tag	SIN	Vehicle Segment	Fuel Type	Total GGEs	Estimated Miles*
[redacted]	[redacted]	9	Sedan/St Wgn Compact	GAS	471	13,939

* Estimated Miles are based on fuel use and vehicle fuel economy ratings and do not align with FAST reported mileage.

	SIN	Vehicle Segment	Fuel Type	Estimated GGEs	Estimated Annual Operating Cost
Comparison Low Cost Option	9	Sedan/St Wgn Compact	GAS	436	$4,806.28

Fuel Type	BEV	PHEV	HEV	E85	B20 (B100 GGEs)	CNG	LPG
Vehicle segment replacement available?	Y	Y	Y	N	N	N	N
Percent of GGEs near alternative Fuel	N/A	N/A	N/A	36%	0%	9%	2%
Replacement Standard Item Number	8	8	9	N/A	N/A	N/A	N/A
Estimated alternative fuel (GGE or kWh)	4,042 kWh	2,240 kWh	N/A	N/A	N/A	N/A	N/A
Estimated petroleum GGEs reduced*	471	357	174	N/A	N/A		
Incremental cost	$8,928.40	$7,294.22	$6,396.33	N/A	N/A		
Estimated Annual Operating Cost**	$3,600.37	$4,302.54	$4,499.62	N/A	N/A		
Estimated Annual Operating Cost Savings or (Addtional Costs) vs. Low Cost Option	$1,205.92	$503.74	$306.66	N/A	N/A		

* GGEs reduced compared to a base case where prior year GGE consumption is all petroleum use.

** Operating Costs include monthly lease rates, mileage rates, and estimated electricity use where appropriate.

Estimated Annual Operating Cost Savings:	
	> $500
	> $250
	> $0 - $250
	Added costs

Identifying EV Candidates with Telematics

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Identifying Ideal EV Candidates

1. Has an EV replacement option

- Current GSA AutoChoice options include sedans, SUVs, minivans, LD vans, and buses
- Expected options in next two years include LD pickups and MD vans
- In next five years, there will probably be EV options for all vehicle types

2. Vehicles that use a lot of fuel have greatest impact

- EVs currently cost more than equivalent conventional vehicles
- But fuel and maintenance costs as well as lifecycle emissions are lower
- Ideal candidates are well utilized

3. But vehicles that drive long distances sometimes need to stop to charge

- Charging stations are widely available in most locations
- PHEVs (gas or electric) can stop at gasoline stations or EV chargers, so this isn't an issue
- Ideal BEV (all-electric) vehicles don't want to stop at fast chargers every day

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Key Metric: Number of times a vehicle needs to charge during the workday

Advanced Analytics Exploration

Varied indicators of EV suitability

Machine learning algorithm trained on telematics daily miles traveled

Improved ability to flag good EV candidates in FleetDASH

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Intent and Feedback

The FleetDASH AFV Screening Tool provides an initial framework for AFV acquisition planning. More detailed analysis is required to ensure final plans can be achieved.

Important fleet constraints to consider:

- ~12%* of the fleet is replaced annually
- AFV availability may be limited geographically or contractually
- Mission specifics or changes are not included in replacement analysis

*Based on FAST inventory and acquisitions excluding the USPS

<u>Evolving EV capabilities and costs:</u>

Range ↑ Incremental Costs ↓

Public charging availability ↑

Fleet manager experience ↑

Expecting the tool to evolve with fleet needs.
Feedback is welcome!

Training & Resources

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Resources & Training

FEMP Federal Energy Management Program

- EV Champion Series
  - June: EV Technology (video)
    EV Financials (video)
  - July: EVSE & Energy (video)
  - August: Site Design
  - September: Site Operations

GSA Fleet®

- Desktop Workshops & New Fleet Mgr Cert. Program
- EV Fact Sheets, Brochures
- Telematics
- GSA Fleet Drive-thru
- Customized Planning

Find more information at https://www.energy.gov/eere/femp/electric-vehicles-federal-fleets

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